



## An Assessment of Low-Pressure Crude Oil Pipelines and Gathering Lines

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### Executive Summary

The McGrath Lake oil spill in Ventura County stimulated public concern regarding the safe operation of crude oil gathering pipelines. This December 22, 1993 incident occurred from a crude oil shipping line. This spill released an estimated 2,200 barrels (42 gallons = 1 barrel) of crude oil. The oil surfaced and flowed through a culvert, traveled through 150 feet of woodland and brush, to McGrath Creek, then flowed another 1,200 feet into McGrath Lake. The lake is part of a tidal wetland within a large coastal dune system.

One of the results of this incident was the passage of California Assembly Bill 3261 (O'Connell) which clarified the jurisdictional authority within production fields for the Department's of Conservation's Division of Oil, Gas and Geothermal Resources (DOGGR). AB 3261 also added Section 51015.05 to the California Government Code mandating that the California State Fire Marshal (CSFM) complete three assignments:

- ! establish and maintain a data base of on-shore crude oil gathering lines and gravity or low pressure pipelines; and,
- ! conduct an assessment of the fitness and safety of on-shore crude oil gathering lines and gravity or low pressure pipelines; and,
- ! investigate barriers and incentives for replacement and improvement of all hazardous liquid pipelines.

CSFM has exclusive regulatory authority over most hazardous liquid transportation pipelines within California. However, all pipelines within production fields, and some gathering, gravity and low pressure lines are exempted from CSFM authority. ***It is important to note that the pipelines involved in the data base and in the fitness assessment as contained in this report are NOT currently jurisdictional to CSFM's pipeline safety program.*** Chapter 5 of this report contains information on the investigation of barriers and incentives for pipeline replacement. Because the issue of barriers/incentives involves many levels of hazardous liquid pipeline transportation, the review included all hazardous liquid pipelines outside production fields, refineries and terminal facilities.

Funding for this project was provided by the U.S. Department of Energy (USDOE). A Pipeline Assessment Steering Committee was established to supply input from local government, industry and the public. EDM Services of Simi Valley, California, was contracted to establish the data



## An Assessment of Low-Pressure Crude Oil Pipelines and Gathering Lines

base, analyze the information and develop the draft report. Prior to submission to the Legislature, the document was reviewed by CSFM, the Pipeline Assessment Steering Committee, the Pipeline Safety Advisory Committee, the California Department of Forestry and Fire Protection, the Resources Agency and the Governor's Office. During this entire review process, only minor editorial changes were made to the document for better word flow or to improve background information. No conclusion established as a result of the data analysis was altered during the review process.

In 1993, CSFM conducted an in-depth study of pipelines under its jurisdiction. Much of the analytical review of the information contained in the current report was evaluated and compared to the results of the 1993 study.

### Comparing Modes of Transportation:

In analyzing the transportation of hazardous liquids, it is important to compare the safety risks of various modes of transportation. In doing so, US Department of Transportation fatality statistics were used. Risk of fatality by mode of transportation can be summarized as follows:

|          |     |
|----------|-----|
| Pipeline | 1   |
| Marine   | 5   |
| Rail     | 51  |
| Highway  | 429 |

In other words, highway transportation results in 429 times more fatalities than pipelines. Order of magnitude comparisons between the other modes can be determined similarly.

A general understanding of these relative risks is essential for those considering regulatory changes which could increase the cost of hazardous liquid pipeline construction, operation and/or maintenance. Any increases in the shipping costs associated with such changes would likely result in a portion of the throughput being diverted from pipelines to other transportation modes.

Since these other modes generally expose the public to a higher risk than pipelines, any such diversion may actually decrease overall transportation safety. There are already signs of this occurring, especially in Southern California. The crude oil from many of the older production fields which was historically transported by pipeline, has been diverted to truck and rail transportation which have the worst safety record.



## An Assessment of Low-Pressure Crude Oil Pipelines and Gathering Lines

### The Data Base and Analysis:

EDM Services conducted an extensive campaign to gather information on crude oil gathering lines and gravity/low pressure pipelines. From a potential study pool of 1,200 participants, only 15 operators were identified as owning and/or operating pipelines which met the study criteria established in statute.<sup>1</sup> Because the resulting data set was so small, there were few meaningful conclusions that could be drawn from this limited data. The data set can be summarized as follows:

|                                     |                      |
|-------------------------------------|----------------------|
| Number of pipeline operators        | 15                   |
| Number of pipelines                 | 113                  |
| Total length of pipelines (miles)   | 496                  |
| Mean diameter of pipe (inches)      | 7.5                  |
| Mean operating temperature          | 74.21F               |
| Cathodically protected pipe (miles) | 317 (64% of total)   |
| Bare pipe (miles)                   | 87 (18% of total)    |
| Median spill size (bbl)             | 3                    |
| Average spill size (bbl)            | 122                  |
| Median damage (\$US 1994)           | \$5,000              |
| Average damage (\$US 1994)          | \$39,020             |
| Length of Underground Pipe (miles)  | 478 (96.3% of total) |
| Number of incidents ( $\geq 1$ bbl) | 10                   |

<sup>1</sup> The pipeline involved in the McGrath Lake oil spill was not one of the pipelines which met the study criteria established in Section 51015.05. However, because of the language in AB 3261 concerning DOGGR, this pipeline has been classified as a production line and is now jurisdictional to DOGGR's pipeline safety program.



## An Assessment of Low-Pressure Crude Oil Pipelines and Gathering Lines

**Overall Incident Rate:** The overall rate for incidents of one barrel or more from the crude oil pipelines under study is very similar to that of hazardous liquid pipelines regulated by CSFM --- 6.72 versus 6.54 incidents per 1,000 years respectively. However, the incident rate for larger spills is generally much less for the smaller crude oil pipelines in this study. The results for the California crude oil pipelines under study are summarized below:

| Spill Event   | Incident Rate |
|---|---------------|
| ≥ 1 bbl (per 1,000 mile years)                        | 6.72          |
| ≥ 10 bbl (per 1,000 mile years)                       | 2.02          |
| ≥ 100 bbl (per 1,000 mile years)                      | 1.10          |
| ≥ 1,000 bbl (per 1,000 mile years)                    | 0.69          |
| ≥ 10,000 bbl (per 1,000 mile years)                   | 0.00          |
| ≥ \$1,000 damage (\$US 1994-per 1,000 mile years)     | 6.72          |
| ≥ \$10,000 damage (\$US 1994-per 1,000 mile years)    | 1.34          |
| ≥ \$100,000 damage (\$US 1994-per 1,000 mile years)   | 1.14          |
| ≥ \$1,000,000 damage (\$US 1994-per 1,000 mile years) | 0.00          |
| Injury (per 1,000 mile years)                         | 0.00          |
| Fatality (per 1,000 mile years)                       | 0.00          |

**Primary Cause of Incidents:** External corrosion is by far the leading cause of incidents, representing 60% of the total. However, with the limited data sample, the cause could not be isolated. The results of the 1993 study regarding the CSFM-regulated hazardous liquid pipelines, indicated that pipe operating temperature and age were the two leading factors contributing to increased external corrosion. It can be presumed that this is also the case for the crude oil pipelines under study. However, the data set is too small to perform a conclusive analysis.



## **An Assessment of Low-Pressure Crude Oil Pipelines and Gathering Lines**

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### **Recommendations Based on Data Analysis:**

As previously stated, the overall incident rate for the crude oil pipelines under study is essentially the same as the incident rate for CSFM-regulated hazardous liquid pipelines. Although the overall leak incident rates for these groups of pipelines is similar, the likelihood of large spills and spills resulting in large values of damage were much lower for the crude oil pipelines in this study. And finally, although the data is limited, there was no evidence to suggest that crude oil spills pose a significant risk to human life. As a result of these findings, we recommend the following:

- ! Develop a set of criteria which can be used to identify pipelines which would likely impact unusually sensitive areas in the event of a leak. These criteria might include: likelihood of a spill from a given pipeline to reach a stream or waterway, etc. The CSFM Pipeline Safety Advisory Committee could be used to accomplish this recommendation.
- ! Distribute this criteria to the owners of the pipelines identified in this study. The operators could then identify those pipelines which would likely impact unusually sensitive areas in the event of a leak.
- ! Include the pipelines identified which would likely impact unusually sensitive areas in the scope/definition of those pipelines regulated by CSFM under Chapter 5.5 of the California Government Code.
- ! Modify the law to require continued leak and pipeline inventory reporting for all pipelines in this study. This will enable the CSFM to keep the database current.

In addition to these recommendations, we suggest the following actions:

- ! Continue to invite the operators of these pipelines as well as representatives of other local and State agencies to the Pipeline Safety Conferences and other training programs provided by the CSFM.
- ! The database effort conducted as part of this study should be expanded to include California's intrastate and interstate pipelines. Funding should be appropriated to support a comprehensive data base (e.g., all pipelines jurisdictional CSFM and pipelines included in this study) and establishment of comprehensive computerized pipeline mapping.



## An Assessment of Low-Pressure Crude Oil Pipelines and Gathering Lines

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### **Barriers and Incentives to Pipeline Replacement or Improvement:**

The third Legislative mandate provided in Section 51015.05 was to investigate the incentive options that would encourage pipeline replacement or improvement, including but not limited to, a review of proposed regulatory, permit, and environmental impact report requirements and other public policies that could act as barriers to the replacement or improvement of pipelines.

CSFM believed that the Legislature did not intend to limit the scope of our investigation to only those pipelines included in the data base and study. Therefore, more than 200 questionnaires regarding incentive options and barriers to pipeline replacement and/or improvement were distributed to:

- ! operators of CSFM-regulated hazardous liquid pipelines
- ! all participants in the study
- ! State regulatory and jurisdictional agencies
- ! local governments serving communities with a high density of oil and gas activity (e.g., San Luis Obispo, Santa Barbara and Ventura counties)
- ! members of the Pipeline Assessment Steering Committee

The questionnaire was designed to gather information on, measure attitudes toward, and obtain suggestions about proposed or potential incentives and barriers to pipeline replacement or improvement. As a State regulator, CSFM felt strongly that a neutral third party should be utilized to evaluate the results of this questionnaire. To that end, USDOE's representatives analyzed the questionnaire responses and authored the recommendations.

The study identified a number of levels of jurisdictional conflict and confusion. Although there was no evidence of perceived conflict among State-level agencies, it is clear that operators in particular perceive a tremendous amount of conflict between State-level agencies, on one hand, and federal, county, and city agencies on the other.

One of the most striking conclusions, therefore, is that the *perception* of problems appears to be a serious problem for the State of California. Although the scope of this study (particularly the questionnaire) did not provide for independent verification or critical analysis of the information provided by the respondents, it is clear that there are any number of perceived barriers to pipeline replacements and improvements. These perceived barriers are particularly acute at the local government level.



## **An Assessment of Low-Pressure Crude Oil Pipelines and Gathering Lines**

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Although detailed recommendations and specific implementation plans would be premature at this time, a number of general suggestions can be made. These suggestions should provide a useful backdrop and help guide the State of California as it further investigates its permitting process.

- ! The State should appoint a single lead agency with jurisdiction over every aspect of the permitting process in California. This lead agency should work in a *partnership* relationship between State and local agencies, with consideration for local land use and other issues. One of the agency's objectives should be to integrate federal, State and local policies for crude oil production and the transportation of crude oil and refined petroleum products.
- ! All permitting requirements should be standardized and redundancies and conflicts should be eliminated. A rigorous evaluation of the permitting process should be undertaken by the newly-appointed lead agency. Each requirement should be justified using scientific or other compelling reasoning.
- ! The newly-appointed lead agency should develop and implement a time line for permit application and approval. This time line should include "consequences" for the agency or operator for not meeting scheduled milestones.
- ! The newly-appointed lead agency should consider the following incentives to repair, replace, or improve pipelines. The most obvious incentive for the operators to improve, repair or replace pipelines will be the comprehensive streamlining of State and local regulations.
  - \$ reduction in the frequency of inspections for new pipelines
  - \$ reduction in the frequency of hydrostatic testing
- ! Pipeline repair/replacement which improves public safety and environmental protection should receive relief from CEQA requirements, including an expanded time frame.